

## **Acquisition and Processing of an Artificial Mini-Language Combining Semantic and Syntactic Elements**

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Most artificial grammar tasks require the learning of sequences devoid of meaning. Here, we introduce a learning task that allows studying the acquisition and processing of a mini-language of arithmetic with both syntactic and semantic components. In this language, inspired from the classic ‘weather prediction task’, symbols have values that predict the probability of being rewarded for a right or left response. Novel to our paradigm is the presence of a syntactic operator which changes the sign of the subsequent value. By continuously tracking finger movement as participants decided whether to press left or right, we revealed the successive cognitive stages associated with the sequential processing of the semantic and syntactic elements of this mini-language. All participants were able to understand the semantic component, but only half of them learned the rule associated with the syntactic operator. Our results provide an encouraging first step in elucidating the way in which humans acquire non-verbal syntactic structures, and show how the finger tracking methodology can shed light on real-time artificial language processing.